



UNIVERSITÀ  
DI PAVIA

**Ph.D. Program in Electronics, Computer Science and Electrical Engineering**

## **COURSE**

### **Statistical Tools for SAR Image Analysis**

***Prof. A. C. Frery***

**OBJECTIVES:** This course discusses key elements in the statistical analysis of Synthetic Aperture Radar (SAR) images. We examine how to describe the physical processes that generate the observed data, and what can be known about the models used to represent those processes. We then address how such understanding can be translated into practical tools, and how these tools can be used to extract meaningful information. We will develop some of those tools in R. Finally, we consider the crucial task of communicating that information effectively. To this aim, we will explore RMarkdown and write reproducible articles

#### **PROGRAM**

- Introduction: aims, contents, platforms and tools (LaTeX, BibTeX, R, RStudio, RMarkdown)
- SAR technology and the basics of SAR image formation
- The multiplicative model
- Properties of the models stemming from the multiplicative model
- The equivalent number of looks
- Inference by analogy
- Inference by maximum likelihood
- Texture analysis as time series

**EVALUATION:** Each student will submit, using a Git repository, an individual report in the form of a research reproducible article (in RMarkdown or Quarto). The report will relate the statistical analysis of a SAR image. This report will be marked according to its presentation quality (10%), completeness (40%), and correctness (50%). Only those reports whose source code compile and produce a PDF document will be marked.

**ATTENDANCE:** The course will take place in the FabSpace Laboratory. Students who are not currently in Pavia can contact Prof. Paolo Gamba ([paolo.gamba@unipv.it](mailto:paolo.gamba@unipv.it)) to receive the ZOOM link

**LECTURES: 15 HRS (3 CFU)**

**EXPERIMENTAL TRAINING ACTIVITY: 20 HRS (2 CFU)**

**DATES:** April. 28, 29; May. 5, 6, 7, 8, 9 (detailed schedule [here](#))

**Ph.D. Coordinator**

Prof.ssa Ilaria Cristiani

Course in English

EMAIL: [paolo.gamba@unipv.it](mailto:paolo.gamba@unipv.it)